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The FM/S/FM trilayer: Inhomogeneous π-phase superconductivity

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Abstract

We proved that the superconductivity in the ferromagnetic metal/superconductor/ferromagnetic metal (FM/S/FM) trilayer is a superposition of the BCS pairing with constant-sign pair amplitude in the S layer and the Larkin-Ovchinnikov-Fulde-Ferrell (LOFF) pairing with the 3D oscillatory pair amplitude in the FM layers. We allow not only the indirect interaction of the FM layers magnetizations via the S layer, but also a possible existence π phase superconducting states in such trilayers. The presence of π magnetic states along with the π superconducting ones allows us to explain the unexpected weak depression of superconductivity which has been found in the short period Gd/La superlattices. © 2006 American Institute of Physics.

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Keywords

π phase states, Ferromagnetism, Multilayers, Proximity effect, Superconductivity